

Vertical Fluxes of Heat Moisture and Momentum During CAMEX-4

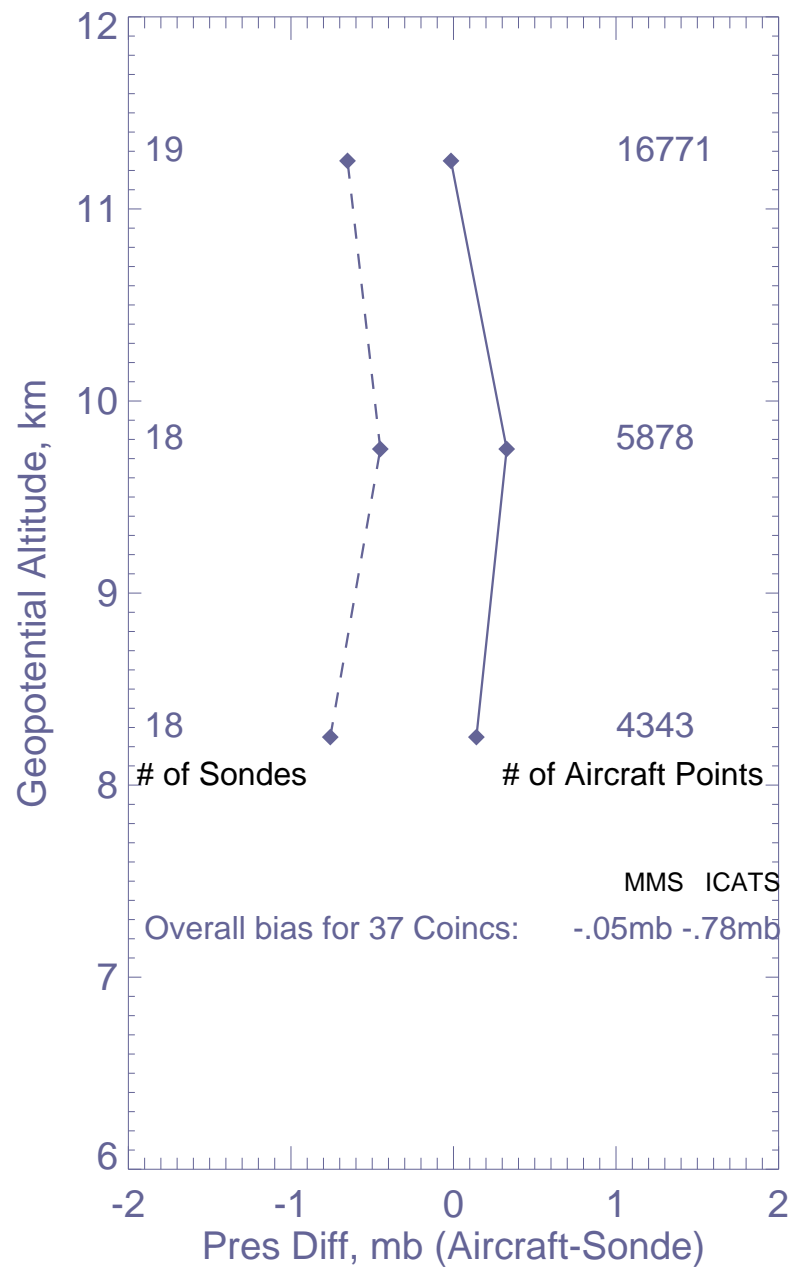
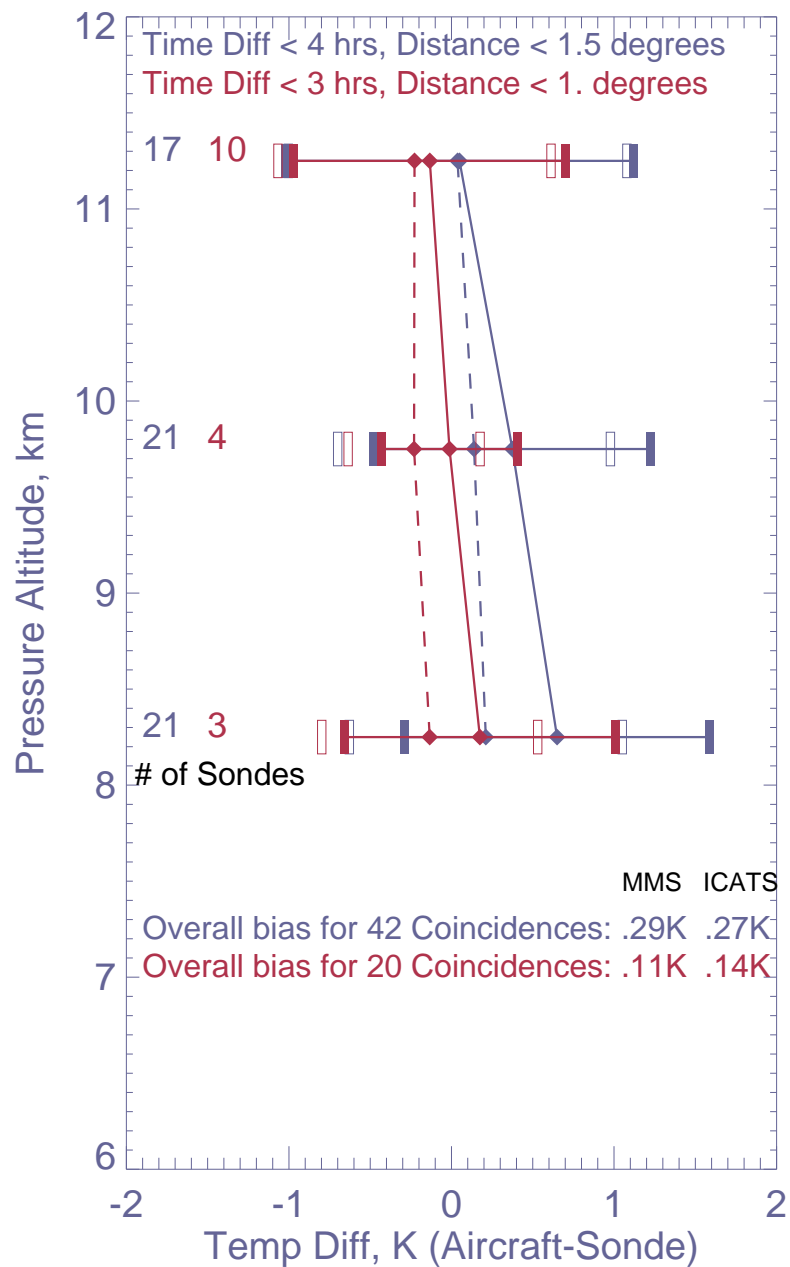
NASA/Ames MMS Group

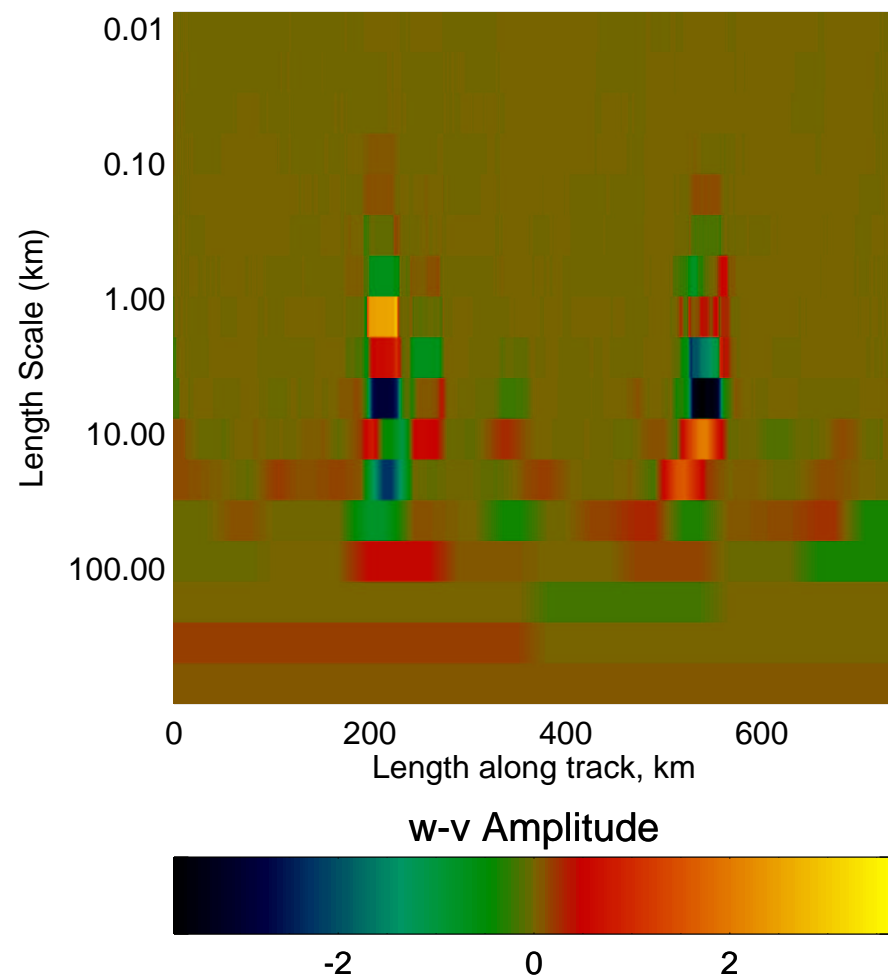
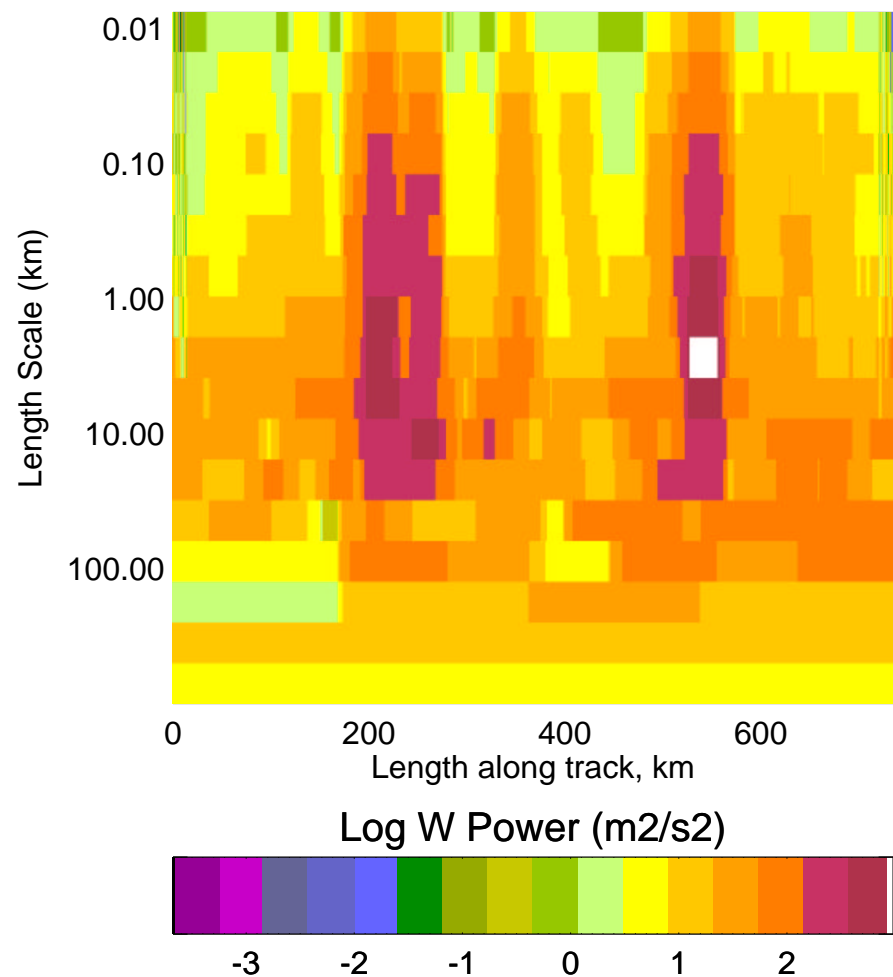
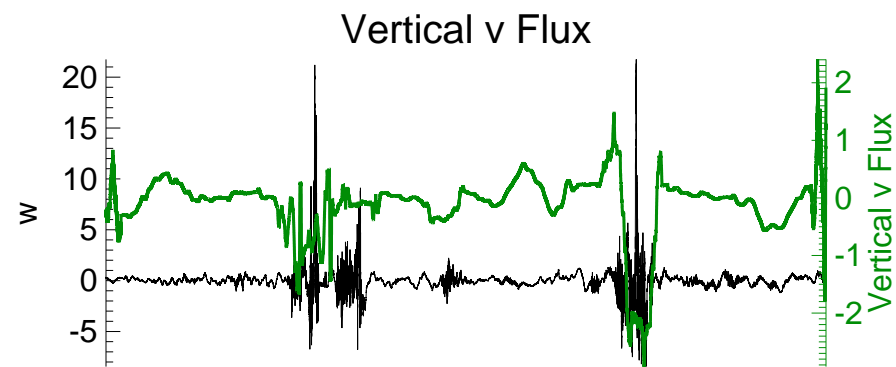
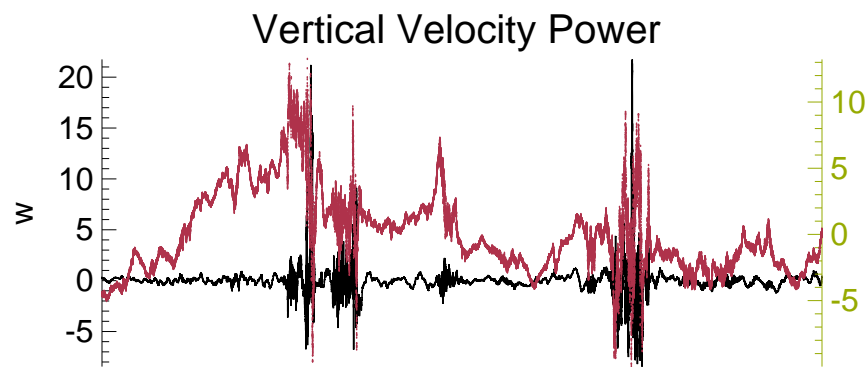
Paul Bui, PI, NASA/Ames

Leonhard Pfister, NASA/Ames

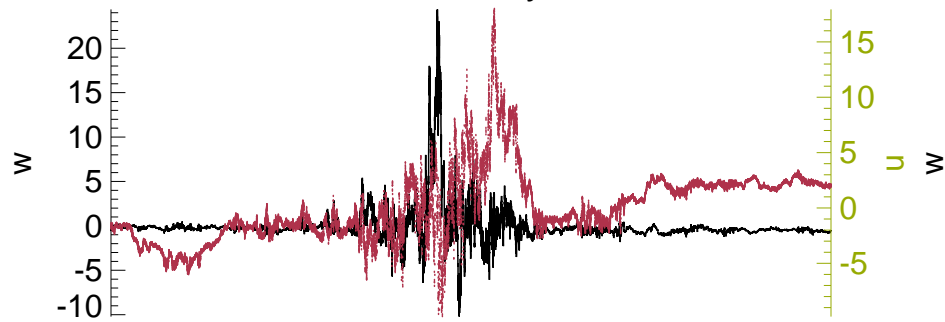
Cecilia Chang, and Jon Dean-Day, San Jose State University

Comparison of aircraft T and P with Radiosondes (MMS, Solid; ICATS, Dashed)

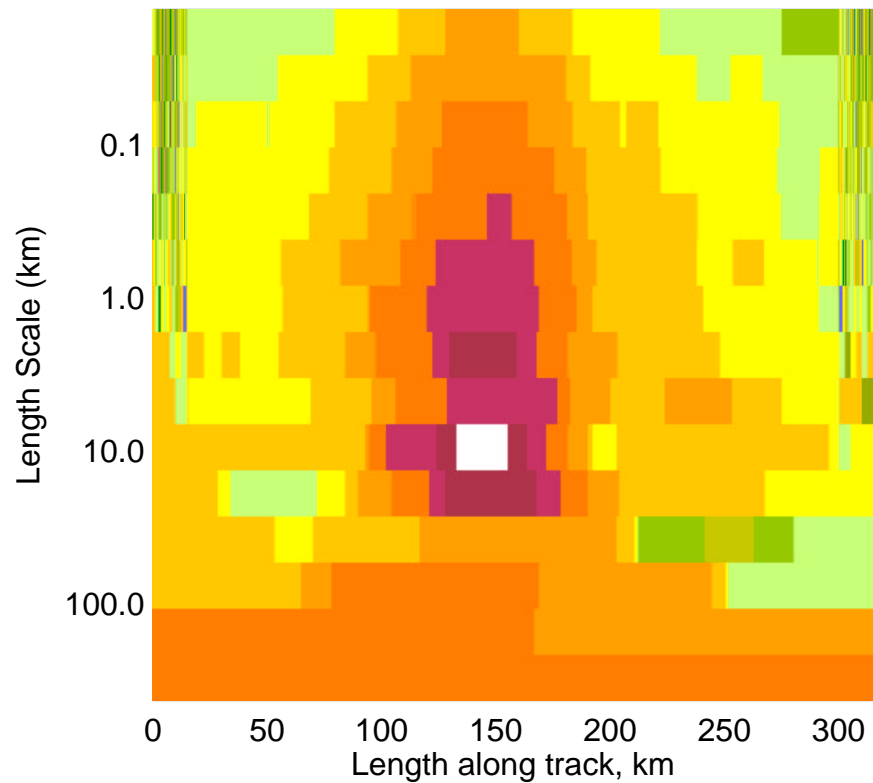
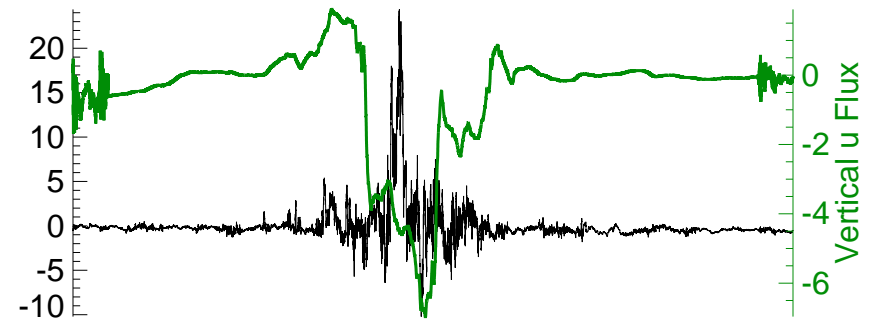




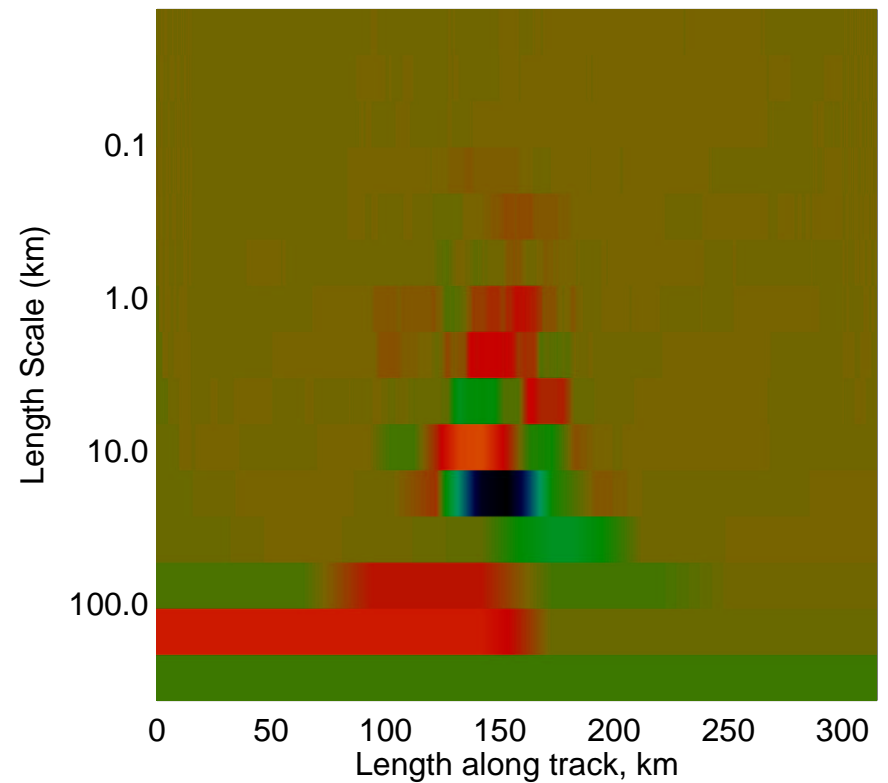
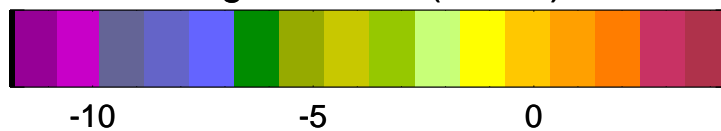
Vertical Velocity Power



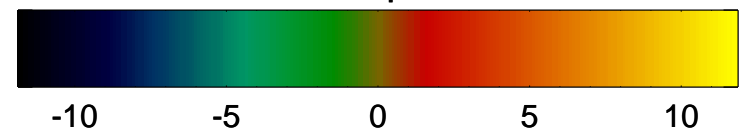
Vertical u Flux



Log W Power (m²/s²)



w-u Amplitude



Case	max u or v vert flux	Contr Hor Scales	Comment
Chantal	6-8	5-20 km	Sfc Wind Advection?
Humberto, 9/23	~3	5-10 km	
Humberto, 9/24	~6	5-10 km	
KAMP, 9/19	2-3	2-10 km	No sfc wind; no grdnt
Lemone, 1983	6-7 (500 mb, aircraft)		GATE Squall Line
Roux, 1998	~5 (10-12 km, radar)		TOGA-COARE line

Summary

- MMS Temperature bias wrt radiosondes is about .3K overall (MMS warmer than radiosondes), comparable to measurement uncertainty. Possible higher bias for lower operating altitudes (up to .75K).
- MMS Pressure bias is about .05 mb overall (MMS lower than radiosondes), comparable to measurement uncertainty. Maximum bias is .4 mb positive near 10 km.
- Vertical fluxes of horizontal momentum have contributions from horizontal scales slightly larger than the scales of the up and down-drafts, ranging from 2 km (KAMP flight) to 20 km (tropical cyclones).

Summary (continued)

- Magnitudes of vertical fluxes in the tropical cyclones are comparable to those noted by LeMone (1983) in tropical squall line. Maximum fluxes for the KAMP flight are half or less than those for the tropical squall line.
- Tropical cyclone vertical momentum fluxes are qualitatively consistent with “advection” of surface momentum upward. KAMP momentum fluxes are in the presence of weak or no mean wind gradients.